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(54) **HYBRID OPTICAL CODE SCANNER USER ALERT**

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H04R 25/02	(2006.01)
G06K 7/10	(2006.01)

(52) **U.S. Cl.**

CPC ***H04R 25/02*** (2013.01); ***G06K 7/109*** (2013.01); ***G06K 7/1096*** (2013.01); ***G06K 7/10554*** (2013.01); ***G06K 7/10722*** (2013.01)

(58) **Field of Classification Search**

USPC 235/440, 454, 455, 462, 472

See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

4,521,678 A *	6/1985	Winter	G06K 7/10881	235/462.25
8,177,134 B2 *	5/2012	Havens	G06K 7/10633	235/462.22
8,439,263 B2	5/2013	Clark et al.		
2012/0007738 A1 *	1/2012	Barkan	G06K 7/10544	340/540
2012/0248188 A1 *	10/2012	Kearney	G06K 7/10722	235/440

FOREIGN PATENT DOCUMENTS

CN	2308916	2/1999
CN	1622114 A	6/2005
CN	101160609 A	2/2006
CN	1759405 A	5/2010
CN	102945357 A	2/2013
EP	1614056	8/2014
WO	2010045192 A1	4/2010

* cited by examiner

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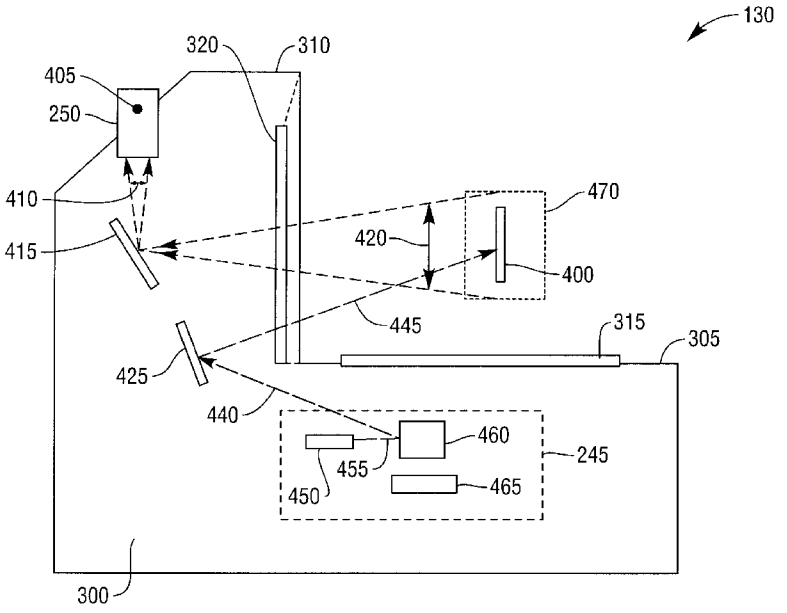
(57) **ABSTRACT**

A hybrid optical code scanner, system and method are presented for alerting a user when one or more events related to a handheld imaging scanner, undocked from the hybrid optical code scanner, occur. The events include moving the handheld imaging scanner beyond it communication range, keeping the handheld imaging scanner undocked beyond a predetermined period of time and activation of a switch on the handheld imaging scanner.

16 Claims, 6 Drawing Sheets



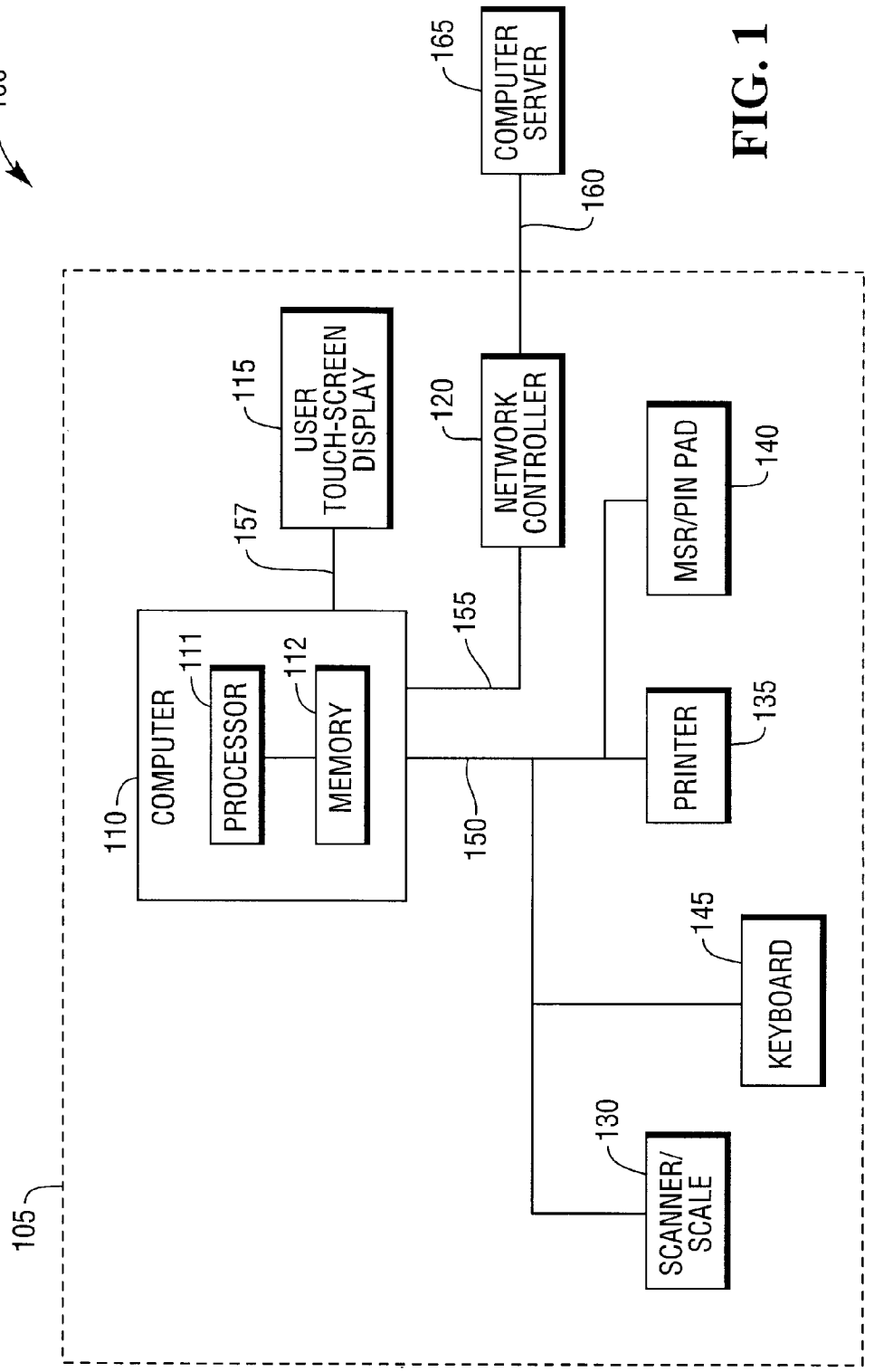

100
105
COMPUTER SERVER
165
160
NETWORK CONTROLLER
120
USER TOUCH-SCREEN DISPLAY
115
157
COMPUTER
110
PROCESSOR
111
MEMORY
112
155
150
MSR/PIN PAD
140
PRINTER
135
KEYBOARD
145
SCANNER/ SCALE
130

FIG. 1

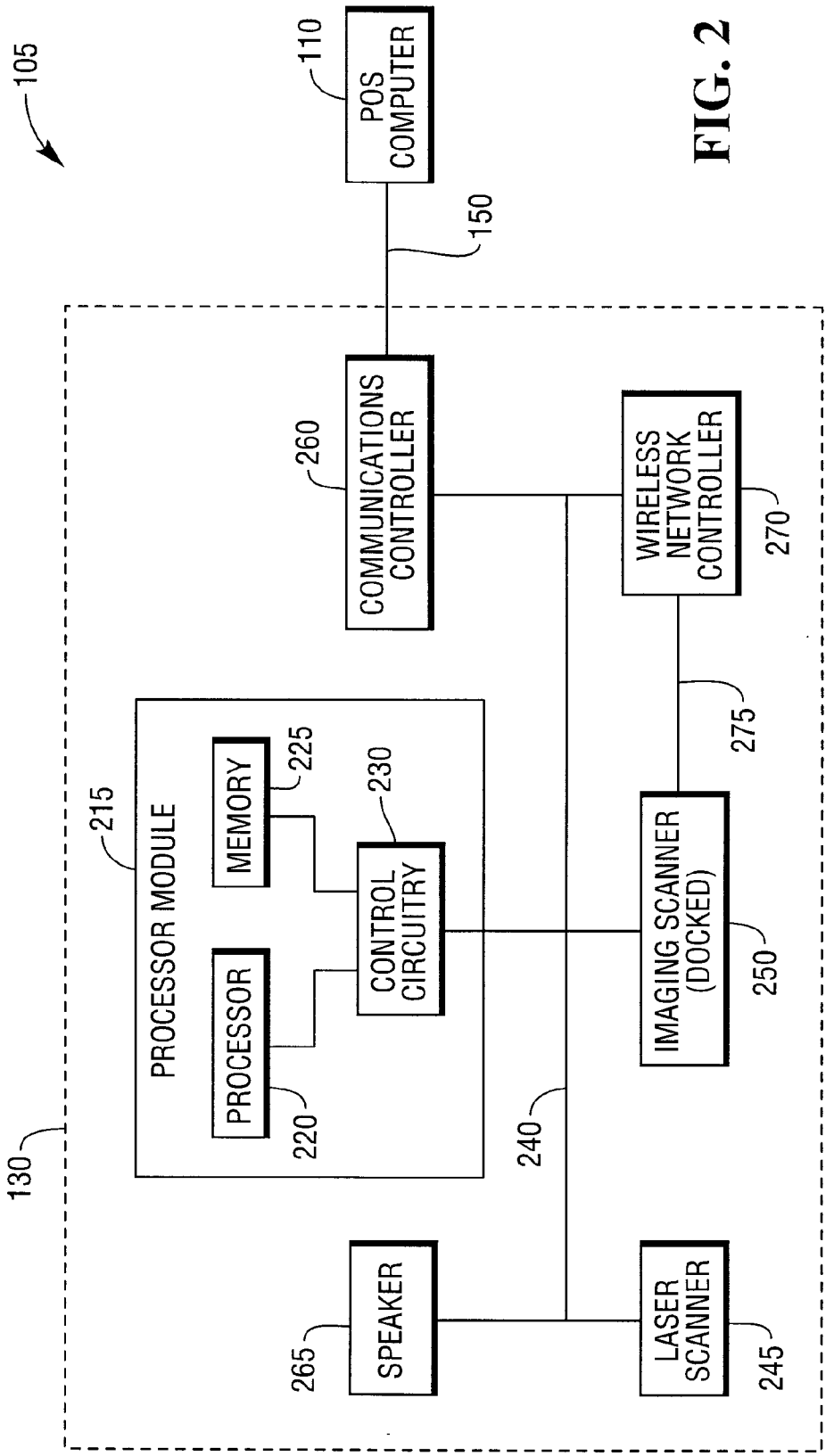

105
110
POS COMPUTER
150
260
COMMUNICATIONS CONTROLLER
WIRELESS NETWORK CONTROLLER
270
275
215
PROCESSOR MODULE
MEMORY
225
230
CONTROL CIRCUITRY
PROCESSOR
220
240
IMAGING SCANNER (DOCKED)
250
130
SPEAKER
265
LASER SCANNER
245

FIG. 2

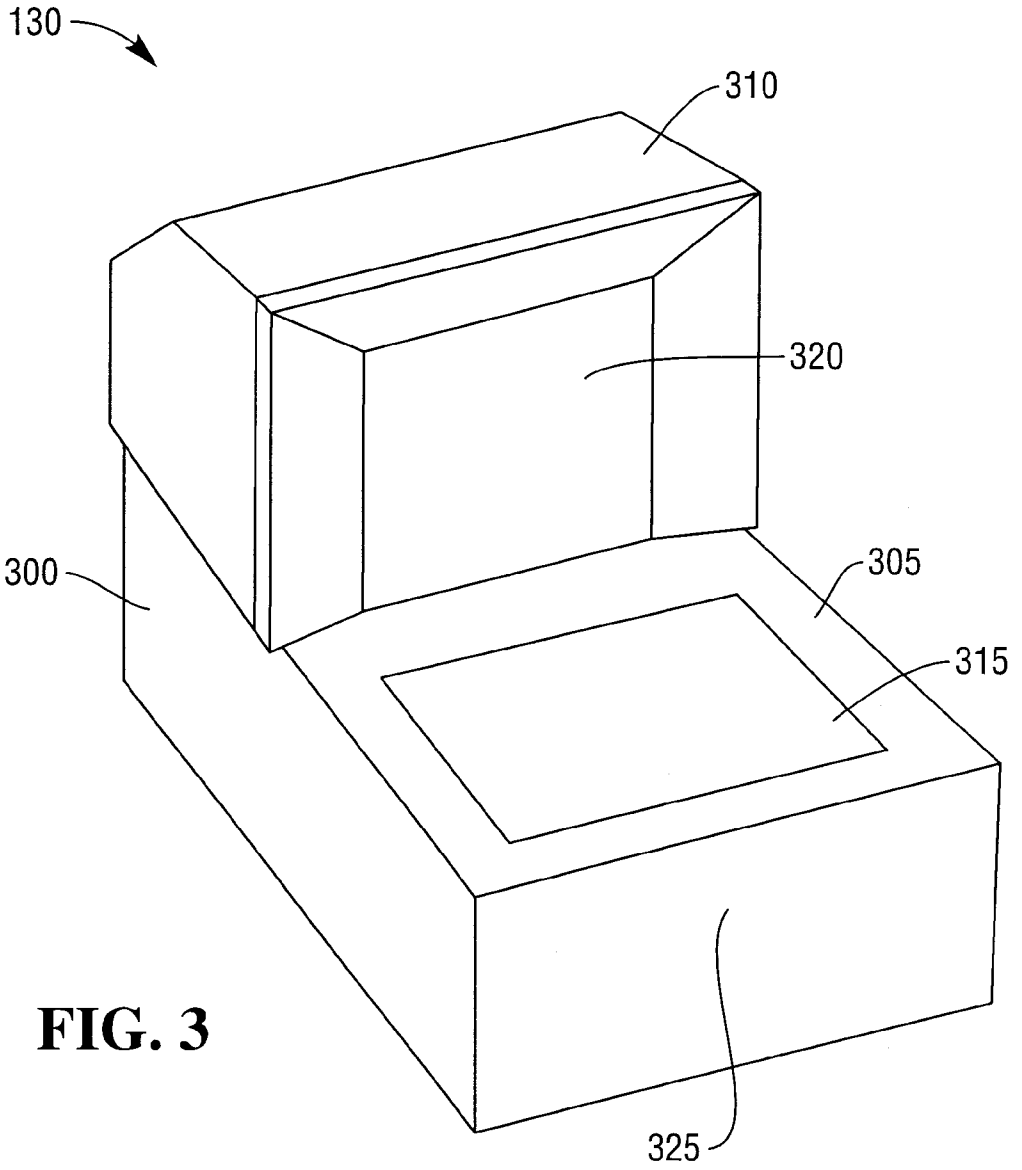


FIG. 3

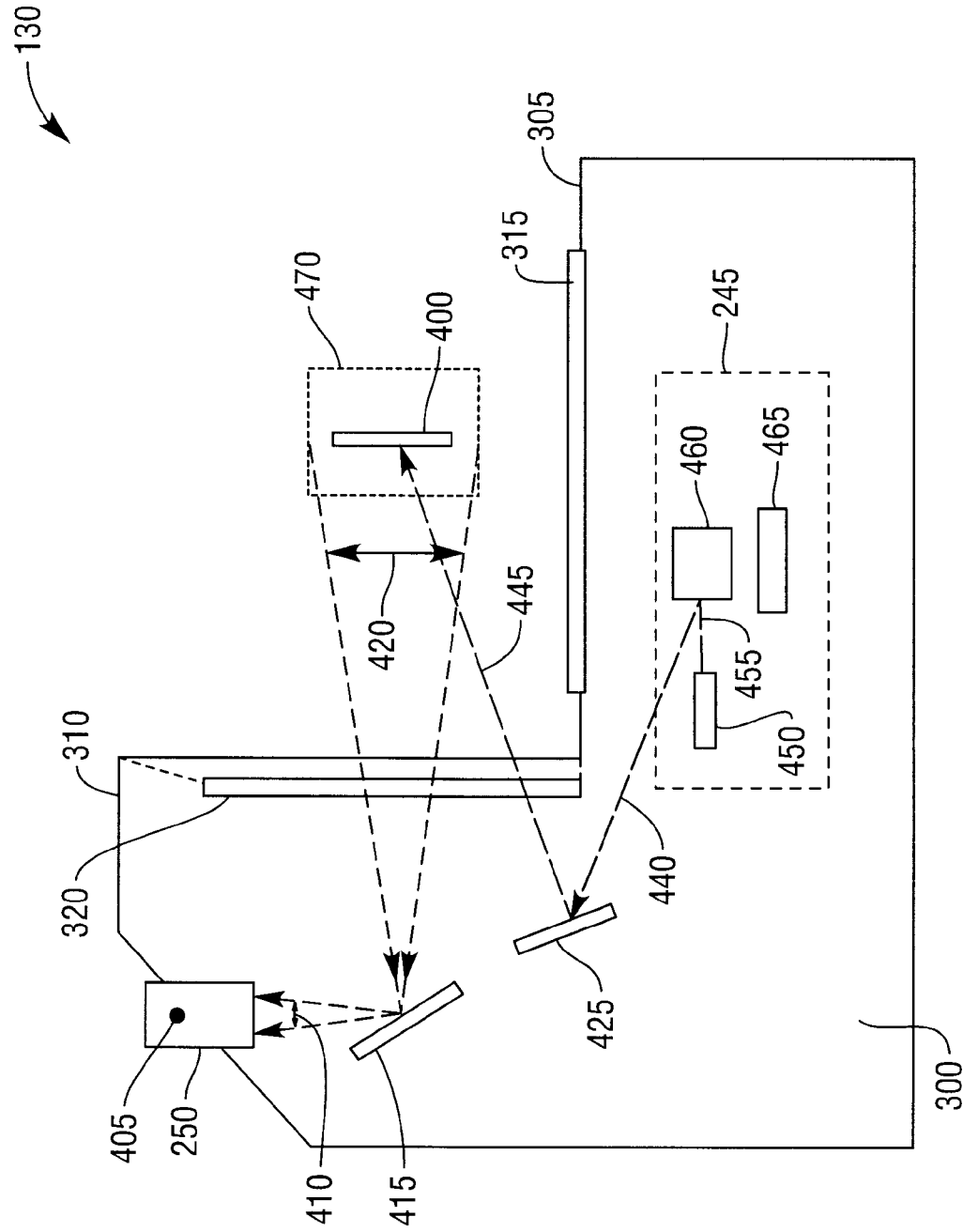

130
305
315
470
400
245
460
465
445
420
455
450
310
320
440
425
405
250
410
415
300

FIG. 4A

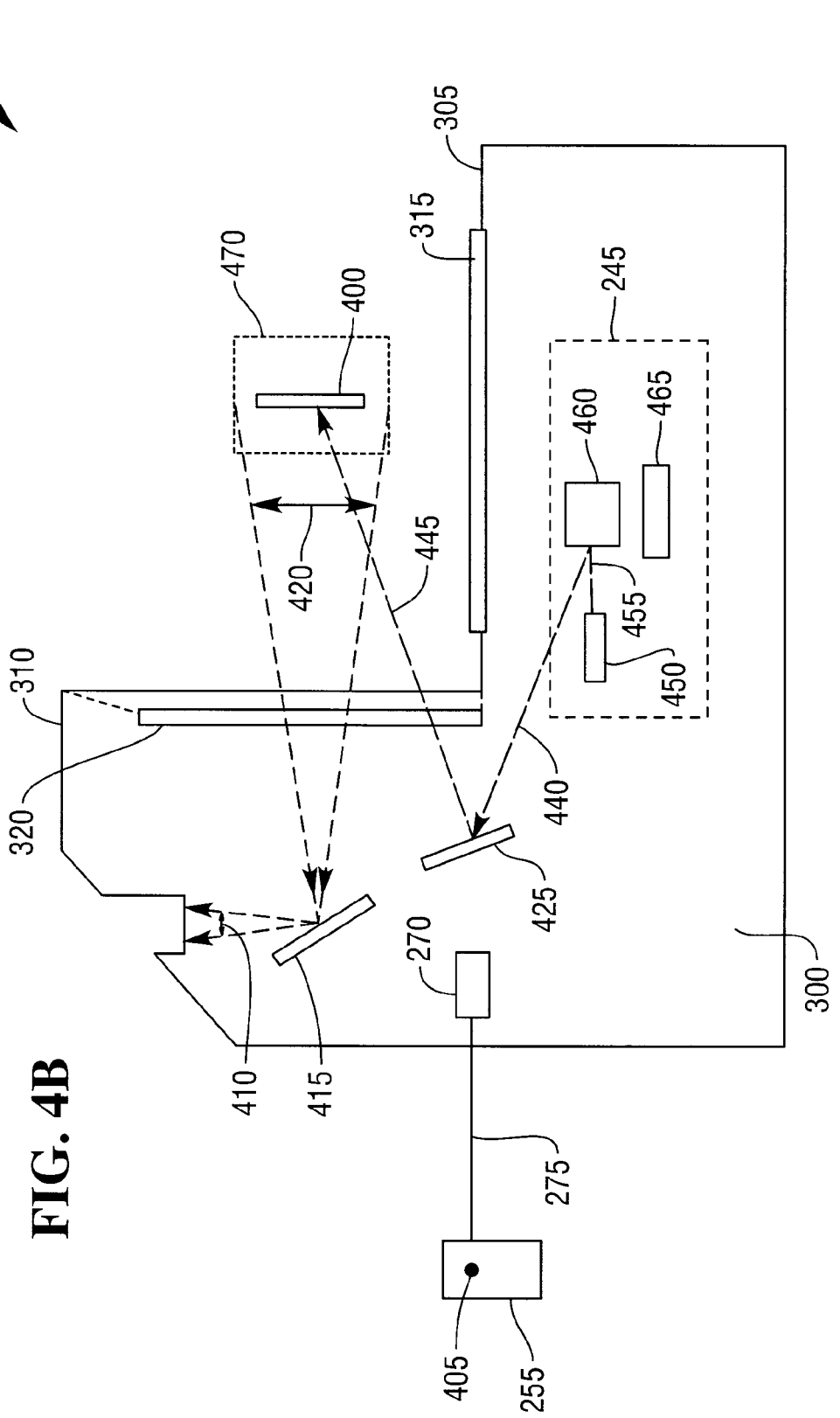

130
305
315
470
400
245
460
465
445
420
455
450
310
320
440
425
270
300
410
415
275
405
255

FIG. 4B

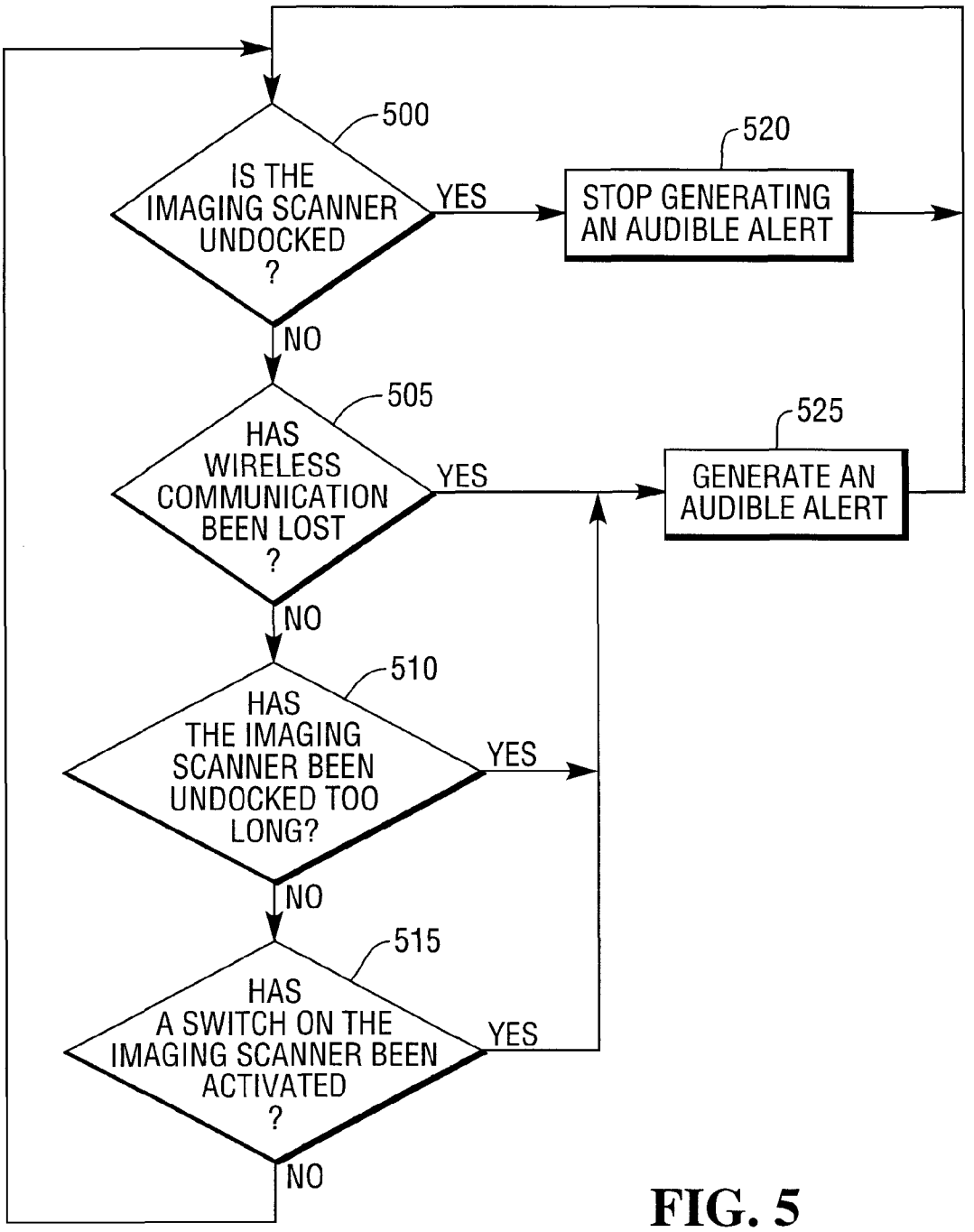

500
IS THE IMAGING SCANNER UNDOCKED ?
YES
520
STOP GENERATING AN AUDIBLE ALERT
NO
505
HAS WIRELESS COMMUNICATION BEEN LOST ?
YES
525
GENERATE AN AUDIBLE ALERT
NO
510
HAS THE IMAGING SCANNER BEEN UNDOCKED TOO LONG?
YES
NO
515
HAS A SWITCH ON THE IMAGING SCANNER BEEN ACTIVATED ?
YES
NO

FIG. 5

HYBRID OPTICAL CODE SCANNER USER ALERT

FIELD OF THE INVENTION

The present invention relates generally to a hybrid optical code scanner. More particularly, but not exclusively, the invention relates to a hybrid optical code scanner and system that includes sounding an alarm related to a removable handheld imaging scanner.

BACKGROUND

Any discussion of prior art throughout the specification should in no way be considered as an admission that such prior art is widely known or forms part of common general knowledge in the field.

A hybrid optical code scanner ("hybrid scanner") includes a laser scanner and an imaging scanner. The two scanners are used to independently read optical codes such barcodes presented to the scanner. The laser scanner reads a barcode by sweeping a laser beam across the barcode, capturing data representing the reflected laser light, and then processing the captured data. The imaging scanner reads a barcode by capturing a complete image of the barcode and then processing the image.

The imaging scanner is a removable handheld device. It can be removed from a docking station in the hybrid scanner and taken to a remote location to read an optical code. The code is then transmitted back to the hybrid scanner. Because the handheld imaging scanner can be operated remotely from the hybrid scanner, it is possible to take the handheld imaging scanner beyond its limited communication range. It is also possible to fail to return the handheld imaging scanner back to its docking station. Both of these conditions reduce the performance of the hybrid scanner because the imaging scanner is not available to scan optical codes at the hybrid scanner.

Therefore, there is a need for a hybrid optical code scanner that identifies these conditions and sounds an alarm to alert a user.

SUMMARY OF THE INVENTION

It is an object of the present invention to overcome or ameliorate at least one of the disadvantages of the prior art, or to provide a useful alternative.

Among its several aspects, one embodiment of the present invention recognizes a condition where the scanning performance of a hybrid optical code scanner is reduced because a handheld imaging scanner has been undocked from the hybrid optical code scanner but is not being used. When the handheld imaging scanner is docked with the hybrid optical code scanner is used along with a fixed laser scanner to scan optical codes, such as barcodes, presented to the hybrid optical code scanner for reading. However, if the handheld imaging scanner is undocked to scan a remote optical code but not returned to and docked with the hybrid optical code scanner, the performance of the hybrid optical code scanner is reduced because only the laser scanner is available for scanning optical codes presented to the hybrid optical code scanner.

One aspect of the present invention generates an audible alert to the user indicating that the handheld imaging scanner needs to be returned and docked with the hybrid scanner.

In accordance with an embodiment of the present invention, there is provided a hybrid optical code scanner comprising: a housing; a speaker located in the housing where the speaker produces audible sounds; a laser scanner adapted to read optical codes presented to the hybrid optical code scanner for reading, where the laser scanner is located in the housing; an imaging scanner adapted to read optical codes, where the imaging scanner is removable from the housing and when the imaging scanner is docked to the housing, it reads optical codes presented to the hybrid optical code scanner for reading and when the imaging scanner is undocked from the housing, it is operated by hand and reads optical codes remote from the hybrid optical code scanner; and where an audible alarm is sent to the speaker when an event related to the imaging scanner being removed from the housing occurs.

In accordance with an embodiment of the present invention, there is provided a computer implemented method for alerting a user when one of a plurality of events occurs related to an imaging scanner undocked from a hybrid optical code scanner, the method comprising: detecting the imaging scanner has been undocked from the hybrid scanner; in response to detecting the imaging scanner has been undocked, determining one of the following conditions: whether wireless communications between the imaging scanner and the hybrid scanner has been lost, and whether the imaging scanner has been undocked for more than a first period of time; and wherein in the event one or more of the conditions occurs, generating an audible alert.

A more complete understanding of the present invention, as well as further features and advantages of the invention, will be apparent from the following Detailed Description and the accompanying Drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

The aspects of the claimed invention can be better understood with reference to the Drawings and the Detailed Description. The Drawings are not necessarily drawn to scale. Throughout the Drawings, like element numbers are used to describe the same parts throughout the various drawing, figures and charts.

FIG. **1** is a high-level block diagram illustrating an exemplar embodiment of a point of sale system.

FIG. **2** is a high-level block diagram illustrating an exemplar embodiment of a hybrid optical code scanner.

FIG. **3** is a high-level drawing illustrating an exemplar embodiment of a hybrid optical code scanner.

FIG. **4**A is a high-level cross-sectional drawing illustrating the exemplar embodiment of the hybrid optical code scanner with a docked imaging scanner.

FIG. **4**B is a high-level cross-sectional drawing illustrating the exemplar embodiment of the hybrid optical code scanner with an undocked imaging scanner.

FIG. **5** is a high-level flow chart depicting an exemplary method for operating an alert function of the hybrid optical code scanner.

DETAILED DESCRIPTION

In the following description, numerous details are set forth to provide an understanding of the claimed invention. However, it will be understood by those skilled in the art that the claimed invention may be practiced without these details and that numerous variations or modifications from the described embodiments are possible.

The claimed invention is described in combination with an assisted point of sale terminal **105**. However, other embodiments are envisioned where the invention is used in combination with a kiosk or a self-service point of sale terminal.

With reference to FIG. **1**, there is provided a high-level block diagram illustrating an exemplar embodiment of an

assisted point of sale (POS) system **100**. The system **100** includes one or more assisted point of sale terminals **105** or self-service point of sale terminals (not shown) connected over a data network **160** to a computer server **165**. The computer server **165**, sometime referred to a store computer server, is a computer that provides resources and functions that are used by the one or more of the terminals **105**. The resources and functions include a price lookup database and connections to one or more networks used to communicate with other computers (both local and remote) to perform additional functions, such as payment transactions using credit or debit card information.

The one or more terminals **105** connect to the server **165** over the network **160** to send and receive data. In some embodiments, the network **160** uses physical cables to connect each terminal **105** to the server **165** and in other embodiments, a wireless interface (not shown) is used to connect each terminal **105** to the server **165**. Still other embodiments use a combination of physical and wireless connections.

The POS terminal **105** performs a number of functions including processing a purchase transaction. A purchase transaction begins when one or more items are presented to the terminal **105** for identification. As each item is indentified, a price is determined. In some embodiments, the terminal **105** retrieves the price for an item from the price lookup database on the server **165**. Some items are sold by weight so the item's weight must be determined before a price can be determined. The terminal **105** maintains information on all items presented including a total price for all items. The terminal **105** processes a payment for the items once all items have been presented and a total price determined. The purchase transaction ends when payment for the presented items has been received or processed.

In the present embodiment, the POS terminal **105** includes a computer **110** that communicates with and controls a user touch-screen display **115**, a keyboard **145**, a network controller **120**, a printer **135**, an MSR/PIN pad **140**, and a scanner and scale combination (scanner) **130**. The computer **110** includes a processor **111**, memory **112** and interface circuitry (not shown). The memory **112** includes both short and long term memory.

Terminal software is stored in the memory **112** and when the terminal software is executed by the processor **111**, it causes the processor **111** to communicate with and control all the devices of the terminal **105**. The terminal software further causes the processor **111** to provide all the features and functions of the terminal **105** including the user interface.

The computer **110** communicates with the other devices of the terminal **105** over a plurality of computer data buses **150**, **155**, **157**. In one embodiment, a peripheral bus **150** is implemented using a Universal Serial Bus (USB). The network controller **120** is connected to the computer **110** using a standard PC bus **155** based on the Peripheral Component Interconnect (PCI) standard. The user touch-screen display **115** uses an industry standard video bus **157** such as HDMI and a separate USB bus for receiving touch screen data.

Referring now to FIG. **2**, there is provided a high-level block diagram illustrating an exemplar embodiment of a point of sale terminal **105**. The terminal **105** includes the hybrid optical code scanner ("hybrid scanner") **130** and the POS computer **110** where both are connected by the computer network **150**. The hybrid optical code scanner **130** includes a processor module **215**, a laser scanner **245**, an imaging scanner **250**, a communications controller **260**, a wireless network controller **270** and a speaker **265**.

Within the processor module **215**, there is included a processor **220**, a memory **225** and control circuitry **230**. The memory **225** includes both volatile and non-volatile memory. Software stored in the memory **225** is executed by the processor **220** which causes the processor **220** to control the devices and operation of the hybrid optical code scanner **130**. The control circuitry **230** provides an interface between the processor **220**, the memory **225**, and a bus **240** used to communicate with other devices that comprise the hybrid optical code scanner **130**. These devices include the laser scanner **245**, the imaging scanner **250**, the communications controller **260** and the wireless network controller **270**. The control circuitry **230** further includes a timer device controlled by the software. The timer device can be programmed by the software to generate a timer control signal after a period of time has passed. The time period can represent a timeout signal that would require an action by the software.

The laser scanner **245** includes a laser generation device (FIG. **4**A, **450**), a laser beam directing device (FIG. **4**A, **460**) for directing a laser beam (FIG. **4**A, **455**) generated by the laser generation device (FIG. **4**A, **450**) and a photo-detector (FIG. **4**A, **465**) for detecting laser light reflected from an optical code back to the laser scanner **245**. The laser scanner **245** also includes a pattern mirror (FIG. **4**A, **425**) used to direct a laser beam (FIG. **4**A, **440**) reflected by the laser beam directing device (FIG. **4**A, **460**).

The imaging scanner **250** is removable handheld scanner and can be used in either a docked or undocked position. When operated in the undocked position, a user will remove the imaging scanner **250** from its docked position in the hybrid scanner **130** and move it to a location where it can capture an image of an optical code. When operated in the docked position, the imaging scanner **250** works with the laser scanner **240** to read optical codes presented to the hybrid scanner **130** for reading.

The imaging scanner **250** includes an image capture device such as a CMOS image sensor. The imaging scanner **250** captures an image of the optical code and processes the image to recover data encoded in the optical code.

The imaging scanner **250** also includes a wireless controller (not shown) that communicates over a wireless network **275** to the wireless network controller **270** of the hybrid scanner **130** and then to the processor **220**. The imaging scanner **250** communicates image and other data over the wireless network **275**. In some embodiments, the imaging scanner **250** uses the bus **240** to communicate with the processor **220** when the imaging scanner **250** is docked with the hybrid scanner **130**. The bus **240** also provides power to operate the imaging scanner **250** and to charge a battery (not shown) located in the imaging scanner **250** when the imaging scanner **250** is docked to the hybrid scanner **130**.

The communications controller **260** includes hardware and software required to communicate with external devices over the computer network **150**. In some embodiments, the computer network **150** is implemented using a USB bus that connects the hybrid optical code scanner **130** to the POS computer **110**.

The imaging scanner **130** includes a speaker **265** used by the imaging scanner **130** to audibility communicate with a user of the pos terminal **105**.

Turning to FIG. **3**, there is provided a high-level drawing illustrating an exemplar embodiment of the hybrid optical code scanner **130**. The hybrid optical code scanner **130** includes a housing **300** comprising a vertical housing component **310** and horizontal housing component **305**. The vertical housing component **310** includes vertical scanning window **320** and the horizontal housing component **305** includes a horizontal scanning window **315**. The vertical scanning window **320** faces the front **325** of the hybrid optical code

scanner **130**. An operator/user of the hybrid optical code scanner **130** stands in front **325** of the hybrid optical code scanner **130** facing the vertical scanning window **320** and moves optical codes (FIG. **4**A, **400**) for scanning through a first volume of space (FIG. **4**A, **470**) generally above the horizontal scanning window **315** and in front of the vertical scanning window **320**.

With reference to FIG. **4**A, there is provided a high-level cross-sectional drawing further illustrating the exemplar embodiment of the hybrid optical code scanner **130** where the imaging scanner **250** is docked to the hybrid scanner **130**. The pattern mirror **425** is one of a plurality of pattern mirrors (not shown). The pattern mirror **425** receives the laser beam **440** from a laser beam directing device **460** and reflects the laser beam **445** through the vertical scanning window **320** to an area in front of the vertical scanning window **320** and generally over the horizontal scanning window **315**. In some embodiments, the laser beam **445** is directed to an area that may extend past the perimeter of the horizontal scanning window **315**. The laser beam directing device **460** causes the laser beam **445** to move so that it scans a volume of space. If the laser beam **445** strikes and moves across an optical code **400**, the reflected laser light is directed (directing devices not shown) back to the laser scanner **245** where the laser light is detected to the photo-detector **465** and data encoded in the optical code read. Laser scanners, in general, are best suited to read one dimensional (1D) barcodes (which are included as an optical code).

The imaging scanner **250** is shown in a docked position in the vertical housing **310**. In the docked position, an image from the optical code **400** travels along a path **420** through the vertical scanning window **320** to a mirror **415** and then is reflected along a path **410** to the imaging scanner **250** for capture and processing.

Turning to FIG. **4**B, there is provided a high-level cross-sectional drawing further illustrating the exemplar embodiment of the hybrid optical code scanner **130** where the imaging scanner **250** is undocked. The imaging scanner **250** has been removed from the hybrid scanner **130** to a location remote from the hybrid scanner **130**. The imaging scanner **250** communicates with the hybrid scanner **130** over the wireless network **275**. The wireless network controller **270** communicates with the imaging scanner **250** when it is in range. When the imaging scanner **250** is moved beyond the range of the wireless network **275**, communications with the imaging scanner **250** is lost and the wireless network controller **270** sends an "out of range" event signal to the processor module **215** indicating the communications with the imaging scanner **250** has been lost. In response to receiving the event signal, software running in the processor module **215** causes the speaker **265** to output an audibly sound to alert the user that the imaging scanner **250** has been move beyond the communications range of the hybrid scanner **130**.

Each handheld imaging scanner **250** is paired with a single hybrid scanner **130** and only communicates with the paired scanner **130**. The imaging scanner **250** includes a switch **405** used to signal the hybrid scanner **130**. When a user actives the switch **405**, the imaging scanner **250** sends an alert signal over the wireless network **275** to the hybrid scanner **130**. When the alert signal is received, software running in the processor module **215** causes the speaker **265** to output an audibly sound to notify the user that the switch **405** on the imaging scanner **250** was activated. This feature provides the user a method to determine which hybrid scanner **130** a particular imaging scanner **250** is paired with.

In addition, the software has the ability to detect when the imaging scanner **250** is docked or undocked with the hybrid scanner **130**. When the software detects the undocking of the imaging scanner **250**, it starts the timer after setting it to timeout after a predetermined period of time has passed. The software is notified when the timeout occurs. If the timeout occurs, software running in the processor module **215** causes the speaker **265** to output an audibly sound to notify the user that the imaging scanner **250** has been undocked from the hybrid scanner **130** for too long and it should be returned and docked with the hybrid scanner **130**. The predetermined period of time is a system parameter and can be changed as needed.

Turning to FIG. **5**, there is provided a high-level flow chart depicting an exemplary method for operating the alert function of the hybrid optical code scanner **130**. The method depicted is implemented by software stored in the memory **225** and executed by the processor **220** in the hybrid optical code scanner **130**. In step **500**, the software determines if the imaging scanner **250** is docked to the hybrid scanner **130**. If the imaging scanner **250** has been removed or undocked from hybrid scanner **130**, the software starts a timer and passes control to step **505**. In step **505**, the software determines if wireless communications between the imaging scanner **250** and the hybrid scanner **130** has been lost. Communications is typically lost, when the imaging scanner **250** is moved beyond the range of the wireless communications of the hybrid scanner **130**. If communications is lost, control passes to step **525** where an audible alert is generated. If communications is not lost, control is passes to step **510**.

In step **510**, the software determines if the timer started in step **500** has reached or exceeded a predetermined time value. The predetermined time value is a system parameter of the hybrid scanner **250** that represents the maximum time period the imaging scanner **250** can be undocked from the hybrid scanner **130**. If the predetermined time value has been reached, control passes to step **525** where an audible alert is generated. If the predetermined time value has not been reached, control passes to step **515**.

In step **515**, the software determines if the switch **405** on the imaging scanner **250** has been activated by a user. If a user activates the switch **405**, a signal is sent over the wireless network **275** to the hybrid scanner **130** and is received by the software. If the switch **405** is activated, control passes to step **525** where an audible alert is generated. If the switch **405** is not activated, control passes to step **500**. This feature allows a user to determine which hybrid scanner **130** a handheld imaging scanner **250** is paired with. The user activates the switch **405** on the imaging scanner **250** and then determines which hybrid scanner **130** generates the audible alert.

Although particular reference has been made to an embodiment that includes a hybrid optical code scanner in an assisted point of sale terminal, certain other embodiments, variations and modifications are also envisioned within the spirit and scope of the following claims. For example, there are embodiments where the invention is used in self-service point of sale terminals and kiosks.

I claim:

1. A hybrid optical code scanner comprising:

a housing containing a docking portion and an aperture in the docking portion; a speaker integrated within in the housing where the speaker produces audible sounds; a laser scanner in the housing adapted to read first optical codes presented to

the hybrid optical code scanner for reading, where the laser scanner is located in the housing;

an imaging scanner removable from the docking portion, wherein the image scanner is adapted to read the first optical codes through the aperture in the docking por-

tion, where the imaging scanner is removable from the housing and when the imaging scanner is docked to the housing and adapted to read, it reads second optical codes presented to the hybrid optical code scanner for reading and when the imaging scanner is undocked from the housing, it is operated by hand and reads optical codes remote from the hybrid optical code scanner; and

a mirror in the housing for directing images containing the first optical codes to the imaging scanner through the aperture in the docking portion when the imaging scanner is docked to the housing;

where an audible alarm is sent to the speaker when an event related to the imaging scanner being removed from the housing occurs.

2. The hybrid optical code scanner of claim **1**, wherein the event occurs when the imaging scanner has been removed from the housing for more than a predetermined period of time.

3. The hybrid optical code scanner of claim **1**, wherein the event occurs when a switch on the imaging scanner that has been removed from the housing is activated.

4. The hybrid optical code scanner of claim **1**, further including:

a wireless network that transfers data between the imaging scanner and the hybrid optical code scanner; and

wherein the event occurs when the wireless network loses contact with the imaging scanner because the imaging scanner has been moved beyond the range of the wireless network.

5. The hybrid optical code scanner of claim **1**, wherein the alarm is an audible tone.

6. The hybrid optical code scanner of claim **1**, wherein the alarm includes one or more audible words describing the event causing the alarm.

7. The hybrid optical code scanner of claim **1**, wherein the sounding of the alarm stops when the imaging scanner is returned to the housing.

8. The hybrid optical code scanner of claim **1**, wherein the imaging scanner is paired to the hybrid optical code scanner and only communicates with the paired hybrid optical code scanner.

9. An optical code scanner comprising:

a housing containing a docking portion and an aperture in the docking portion; a first scanner in the housing adapted to read first optical codes;

a second scanner removable from the docking portion, wherein the second scanner is adapted to read the first optical codes through the aperture in the docking portion when the second scanner is docked to the housing and adapted to read second optical codes when the second scanner is undocked from the housing;

a mirror in the housing for directing the first optical codes to the second scanner through the aperture in the docking portion when the second scanner is docked to the housing; and

a speaker integrated within the housing for producing audible sounds;

wherein an audible alarm is sent to the speaker when an event related to the second scanner being removed from the housing occurs.

10. The optical code scanner of claim **9**, wherein the event occurs following timing of a predetermined time period by the first scanner following removal of the second scanner from the docking portion.

11. The optical code scanner of claim **9**, wherein sounding of the alarm stops when the second scanner is returned to the docking portion.

12. The optical code scanner of claim **9**, wherein the first scanner comprises a laser.

13. The optical code scanner of claim **9**, wherein the second scanner comprises an imager.

14. The optical code scanner of claim **9**, wherein the housing comprises a vertical housing component with a vertical scanning window and a horizontal housing component with a horizontal scanning window, and wherein the mirror directs the first optical codes from a direction through the vertical scanning window.

15. The optical code scanner of claim **14**, wherein the docking portion is located in the vertical housing component.

16. An optical scanning method comprising:

activating a first scanner in a scanner housing and a removable second scanner in a docking portion of the scanner housing to read a first optical code during a first mode of operation;

directing the first optical code to the second scanner through an aperture in the docking portion during the first mode of operation;

reading a second optical code by the second scanner during a second mode of operation when the second scanner is undocked from the docking portion; and

sending an alarm to a speaker integrated within in the scanner housing when an event related to the second scanner being removed from the docking portion occurs.

* * * * *